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The Army College Fund and Military Manpower: A Review of Existing Research

Edward J. Schmitz
U.S. Army Research Institute

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The Army College Fund (ACF) is an important enlistment incentive for attracting highly capable individuals to the Army. This report surveys research concerning the Army College Fund and military manpower. Researchers found that (a) the ACF produced significant increases in the number of high-quality enlistments, although there is substantial variation in the specific amount of the increase; (b) no empirical research has been performed on retention effects of educational benefits; (c) limited research has been performed on the projected cost of the ACF program, and these projections also vary considerably. A sensitivity analysis of the cost/effectiveness of ACF as an enlistment incentive was performed by taking high and low estimates of both enlistment effects and program costs. The results indicate that the ACF is as cost/effective an enlistment incentive as enlistment bonuses, and very likely to be a much more efficient market expander. Key ... Army ...
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Research Report 1572

The Army College Fund and Military Manpower: A Review of Existing Research

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August 1990

The Manpower and Personnel Policy Research Group of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research on significant personnel policy issues. One such issue is the Army College Fund (ACF), which is a key enlistment incentive for recruiting highly capable individuals into the Army. This research report summarizes the current status of research knowledge concerning the Army College Fund. While there are many estimates of the enlistment effect of the ACF, the literature provides limited information on the retention effects and costs of this program. However, even these limited data indicate that the ACF is a cost-effective enlistment incentive.

This research was conducted at the request of the Office of the Deputy Chief of Staff for Personnel (ODCSPER). Results were presented to the ODCSPER in May 1988.

EDGAR M. JOHNSON
Technical Director

THE ARMY COLLEGE FUND AND MILITARY MANPOWER: A REVIEW OF EXISTING RESEARCH

<u>EXECUTIVE SUMMARY</u>

Requirement:

The Army College Fund (ACF) serves as an important enlistment incentive for highly capable individuals to serve in the Army. Recently, Congress has questioned the cost-effectiveness of the Army College Fund as presently managed by the Army.

Procedure:

A review of the research on the manpower effects of the ACF was undertaken. This review included enlistment effects, occupational choice effects, retention effects, and program costs. Both empirical results and theoretical approaches are summarized.

Finding:

Considerable evidence exists from both econometric models and surveys that the ACF substantially increased enlistments among males eligible for the program. Little research has been done thus far on the program's effects on occupational choice, retention, and program costs. The existing research results indicate that the program appears to be a cost-effective enlistment program, even with high cost assumptions.

Utilization of Findings:

The results of this research can be used by ODCSPER to address questions concerning the manpower impact of the ACF program and to identify future research needs.

THE ARMY COLLEGE FUND AND MILITARY MANPOWER: A REVIEW OF EXISTING RESEARCH

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THE ARMY COLLEGE FUND AND MILITARY MANPOWER:

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INTRODUCTION

For over thirty years, educational benefits have been viewed as a means to compensate veterans for their service in the military. However, the end of conscription has resulted in military educational benefits evaluated on their cost-effectiveness at increasing the number of highly capable individuals enlisting in the Army. Thus, the 1970s saw the GI Bill with the less generous Veterans' Educational Assistance Program (VEAP), and a reliance on pay and cash bonuses as the economic incentives of choice for prudent force management.

The 1980s saw the return of educational benefits as a policy mechanism to improve military recruiting. In 1982 the Army College Fund was implemented for high quality Army recruits entering selected critical skills. In 1985 the VEAP was replaced by the Montgomery GI Bill for all services.

The increased reliance of the military on educational benefits has raised many of the earlier issues of cost-effectiveness. In addition to the effect of benefits on recruit supply, there are concerns over the impact of educational benefits on retention, and eventual program costs.

This report provides background information on many of the policy issues raised concerning military educational benefits in general, and the Army College Fund (ACF) in particular. A brief history of recruiting and educational benefit policy since the end of the Vietnam War is provided. Many of the issues raised in the policy debate over educational benefits are discussed. Research approaches and results of analyses relevant to the ACF's impact on military manpower are summarized. Finally, there is a discussion of the major policy research issues related to the military's use of educational benefits.

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RECRUITING AND EDUCATIONAL BENEFITS

Recruiting During the Post-Vietnam Era

The Army presents the greatest recruiting problem of all the military services. First, it is by far the largest service. Over 40 percent of all military enlistments, or about 140 thousand new recruits, enter the Army each year. Compared to other military services, the Army has been portrayed as having jobs that provide few marketable skills, and such jobs are often performed under undesirable working conditions. A survey conducted among 18 to 21-year-old youth found the military ranked significantly below the labor market in general in terms of job satisfaction, and the Army was by far the lowest ranked service (Blair & Phillips, 1983). The Gates Commission, in its study of ending the draft, predicted the Army would face the greatest difficulty because of nonpecuniary factors associated with its working conditions (Studies for the Commission on the All Volunteer Armed Forces, 1970).

Sheer numbers have presented less of a recruiting problem than obtaining the desired composition, however. The Army has either made or come close to achieving its numerical recruiting objective in every year of the all-volunteer force except one. (See Table 1). However, the Army desires male high school graduates who score high on the Armed Forces Qualifying Test (AFQT). The nature of the military makes young men much more in demand by the Army than women. Many occupations are closed to women because of their combat nature. Many other jobs are either combat related or in fields traditionally dominated by men.

High school graduates are preferred because they tend to be much more likely to successfully complete their enlistments. Research by Buddin (1981), Baldwin and Daula (1984), and Manganaris and Schmitz (1984) has found that high school graduation status reduces first term attrition to roughly half that of nongraduates. This greatly reduces the associated recruiting and training costs necessary to maintain the organization.

Above average test scores are desired because they appear to be related to greater training success and higher job performance. Armor, Fernandez, Bers, and Schwarzbach (1982) and Fernandez and Garfinkle (1985) have found AFQT scores to predict job performance as measured by tests. Others, such as Nelson, Schmitz, and Promisel (1984) and Scribner, Smith, Baldwin, and Phillips (1986) have found test scores to predict performance in critical tasks for antiaircraft defense and tank gunnery. The Congressional Budget Office (1986), in reviewing findings on soldier performance, acknowledged that there appears to be a general relationship between military productivity and test scores in the initial enlistment, although there are many unanswered questions about the nature of that relationship.

Young men with these characteristics tend to be relatively scarce. The Army is willing to enlist all males with these attributes who apply.

Table 1

Post-Vietnam Army Enlistment Statistics

Fiscal Year	Non-prior service objective	Non-prior service accessions	Percent of objective	Percent diploma graduate	Percent Test Score Category	
					I-IIIA	IV
1974	184,700	182,224	98.7	50.1	52.5	17.8
1975	183,900	184,600	100.4	57.8	57.6	10.0
1976	180,200	180,175	100.1	58.6	54.8	7.6
1977	167,900	168,398	100.3	59.2	34.2	43.8
1978	126,900	124,029	97.7	73.7	37.9	39.3
1979	149,200	129,284	86.7	64.1	30.6	46.0
1980	157,800	158,179	100.2	54.3	26.0	51.9
1981	116,800	117,915	101.0	80.3	40.0	30.9
1982	115,600	120,353	104.1	86.0	53.0	19.2
1983	132,400	131,702	100.3	87.6	61.4	12.0
1984	131,353	131,702	100.3	90.8	63.4	10.2
1985	119,000	119,121	100.1	90.7	62.9	8.5
1986	126,875	127,143	100.2	90.8	63.0	3.8
1987	119,500	120,512	100.8	91.1	66.7	3.9

However, competition from post-secondary schools and the labor market results in relatively few of these youths who are willing to enlist On the other hand, nongraduates, test category IV individuals, and women are generally demand constrained. There are policy limits on the number of such candidates who are permitted to enlist.

The Army was successful in recruiting the large numbers of soldiers needed in the first few years of the all-volunteer force. Enlistment trends for high school graduates and test scores were all positive. (See Table 1). However, in the late 1970s recruiting difficulties developed. Not only did the average quality of recruits decline sharply, but the Army failed to meet its recruiting object ves in FY78.

Several different forces converged to produce recruiting difficulties for the Army:

- Loss of the GI Bill

- Decreasing unemployment

- Declining relative military pay

- Misnorming of the Armed Services Vocational Aptitude
    Battery (ASVAB)

The Vietnam Era GI Bill expired in December 1976, and was replaced by the less generous Veteran's Educational Assistance Program (VEAP). The GI Bill was discontinued because of concerns over its efficiency, and it was viewed as a less effective recruiting incentive than direct pay. Moreover, it provided soldiers a strong incentive to leave the service to acquire civilian training. The annual costs of the steady-state GI Fill were estimated at $1.5 billion annually (Nelson, 1986).

Labor market conditions deteriorated substantially between 1976 and 1979. Considerable research has found a strong positive correlation between unemployment and enlistments (Cooper, 1977; Huck & Allen, 1977; Grissmer, 1978, Dale & Gilroy, 1983b; Brown, 1985). Also, these and other studies have found that when military pay declines relative to civilian wages, quality enlistments decline. Between 1976 and 1979 unemployment dropped 34 percent and relative military pay decreased 11 percent.

During FY76, a major problem occurred with the ASVAB. New versions of the test were not properly calibrated. The test scores were initially reported as higher than they actually were. Many individuals who were originally scored in test category III (percentiles 31 through 49) were actually in category IV (percentiles 10-30). While the army believed it was enlisting only about 10 percent in test category IV, it was in fact enlisting over 50 percent (Maier & Truss, 1983). This problem was not corrected until the start of FY81.

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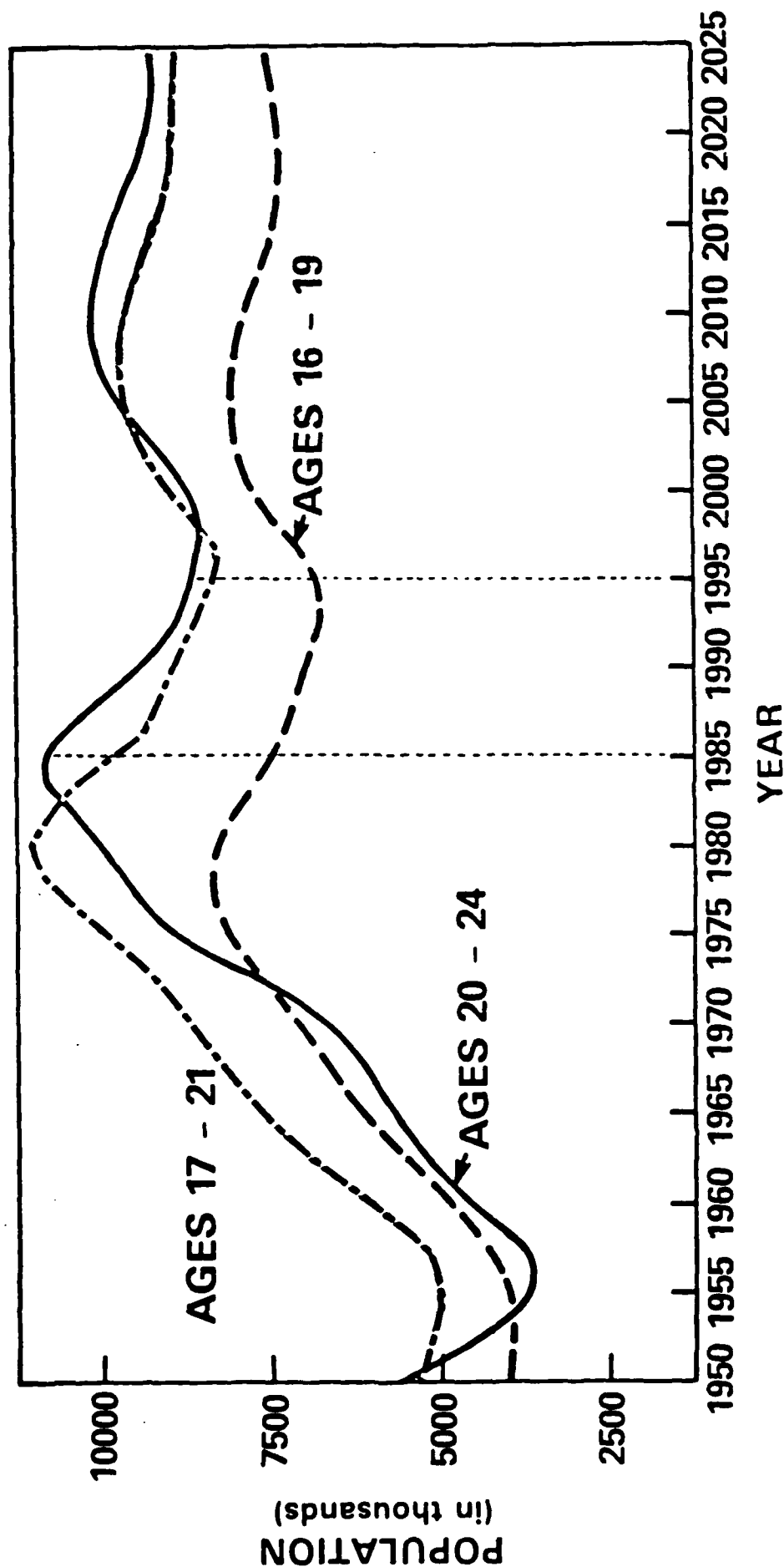# MALE POPULATION

AGES 16 – 19, 17 – 21, AND 20 – 24

Figure 1. Male youth population trends

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In addition to the recruiting difficulties of the late 1970s, the long term outlook posed further problems. Figure 1 illustrates the population trend for young male high school graduates was beginning to decline and would continue to decline over the next decade as the post war baby boom generation aged. By 1990 the youth population could be expected to decline by 17 percent relative to the postwar peak (Hosek, Fernandez, & Grissmer, 1986).

Educational Benefits During the All-Volunteer Era

While the draft ended in 1973, the Vietnam era GI Bill remained in effect through the end of 1976. The GI Bill provided all veterans with tuition assistance and stipends of up to $16,500, regardless of service, enlistment qualifications, or occupation. Furthermore, benefits were adjusted for the number of dependents and were periodically increased to compensate for inflation.

Table 2 describes the major changes in educational benefits that have occurred in the post-Vietnam era. The introduction of the VEAP in 1977 marked a major policy change in the design of educational benefits. The net cost of educational benefits was reduced in three ways. First, individuals were required to make contributions in order to participate. Whereas the GI Bill was available to all previous recruits, VEAP was only available to those who selected to participate and make contributions. The individual's contributions were matched two for one, up to the maximum contribution level of $2,700. Thus the maximum benefit of $16,500 obtainable under the GI Bill, was reduced to $5,400. Also, VEAP benefits were neither indexed for inflation nor related to the number of dependents.

In January 1979 the Department of Defense began the Multiple Option Recruiting Experiment (MORE) to test enlistment incentives. The Army experimented with increased educational benefits, a two-year enlistment tour, and initial assignments to Europe. The educational bonuses were referred to as "kickers". Like the GI Bill and VEAP, these kickers could only be used towards educational programs approved by the Veteran's Administration. However, unlike previous educational benefit programs, these increased benefits (or kickers) were restricted to high quality recruits (high school diploma graduates scoring 50 or above on the AFQT) enlisting in selected military occupational specialties (MOS), primarily in the combat arms. Eight different combinations of kickers and enlistment terms were offered, with kickers ranging from $2,000 to $6,000. The typical kicker for a three year enlistment was $3,000.

The first year of the MORE experiment was analyzed by Haggstrom, Blaschke, Chow, & Lisowski (1981). The results were inconclusive and a number of problems with the experiment were raised. Regression analysis found that kickers programs increased enlistments over the VEAP program, but the results were not statistically significant. The generally poor recruiting environment of FY79 and data problems, such as the classification of seniors who entered the DEP as low quality, made the results particularly unconvincing.

Table 2

Post-Vietnam Military Educational Benefit Programs

Fiscal Year	Program	Cost to participate	Max Government benefits	Eligibility	MOS coverage
1976	GI Bill	none	$16,500	all	all
1977	VEAP	up to $2,700	$ 5,400	all	all
1979	MORE	up to $2,700	$5,400-$11,400	I-IIIA graduate	targeted
1980	SUPER VEAP	up to $2,700	$11,400	I-IIIA graduate	targeted
1981	EATP	0 to $2,700	$5,400-$17,400	I-IIIA graduate	targeted
1982	Army College Fund	up to $2,700	$17,400	I-IIIA graduate	targeted
1985	New Army College Fund	$1,200	$24,000	I-IIIA graduate	targeted

From December 1979 through November 1980 nearly the entire country was covered by the basic VEAP program with kickers ranging from $2,000 to $6,000 for high quality enlistments in specific skills. This program was marketed as Super VEAP. Since Army recruiting had deteriorated relative to other services, the Army was permitted to offer a more generous educational benefit program.

An additional experiment with educational benefits was discussed by Congress and the Defense Department during 1980. The debate between the services and in Congress raised a number of major issues that should be addressed by such an experiment. First, there was the issue of whether higher benefit levels would bring in sufficiently larger numbers of high quality applicants. Second there was concern over interservice competition; would higher benefits for the Army simply take enlistments away from the Navy and the Air Force? Also, there was concern about the contributory nature of the VEAP program. While such a feature could be expected to reduce costs, it could also discourage enlistment. Finally, the implications of educational benefits for retention were discussed. Even if the program served as an enlistment incentive, it could discourage reenlistments. Lower reenlistments would mean that future recruiting could require increased resources, even if educational benefits aided recruiting.

In FY81, the Office of the Secretary of Defense conducted an experiment with different educational benefits to determine if more effective programs could be developed. Four different programs were used in the experiment to examine the recruiting and retention issues related to educational benefits. All programs were targeted to provide additional benefits only to high quality people enlisting in specific MOS.

Table 3 summarizes the features of the four educational benefit programs tested in FY81. The control was the Super VEAP program that had existed since 1979. Super VEAP covered 52 percent of the country's population. Other services only offered basic VEAP in the control program.

The first experimental program, was referred to as Ultra VEAP and included 18 percent of the population. It was similar to Super VEAP in that soldiers were required to contribute up to $2,700, and other services were offering only basic VEAP. However, Ultra VEAP offered kickers of up to $12,000 above the basic VEAP benefit.

The second experimental program covered 15 percent of the nation, and was known as the Tuition/Stipend Program. In many ways it was analogous to the old GI Bill. No contributions were required, benefits were the same for all services, and were indexed for inflation. The Tuition/Stipend Program was also unique in its potential impact on retention. If a soldier chose to reenlist, he or she had the option of either transferring the benefit to a dependent or receiving 60 percent of its value in cash.

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Table 3

FY81 Educational Assistance Test Program Cells

Program	Cell size	Maximum contribution	Maximum benefits Army	Maximum benefits other services	Cash Value of benefits at reenlistment
Super VEAP	51%	$2,700	$11,400	$ 5,400	none
Ultra VEAP (Army College Fund)	19%	$2,700	$17,400	$ 5,400	none
Noncontributory VEAP	15%	$ 0	$14,100	$ 8,100	none
Tuition/Stipend	15%	$ 0	$15,600	$15,600	$9,360

The final experimental program, noncontributory VEAP, was similar to Super VEAP. A recruit could acquire the same level of benefits, except that no contributions were required; the $2,700 contribution was automatically paid by the military. This program applied to eligible individuals in all services, although only the Army maintained the kickers. Noncontributory VEAP also covered 15 percent of the U.S.

One other element of the Educational Assistance Test Program was experimentation with enlistment term for the Army. Previously, the standard military enlistment was three years in the Army and four years in the other services. All programs tested in 1981 included a two-year enlistment option for the Army. Benefits also differed for enlistment terms across programs. Table 4 illustrates the benefit levels by program and enlistment term. For example, the Ultra VEAP enlistment produced no increase in benefits for a four year enlistment over a three year one, while a four year enlistment under the Tuition Stipend Program produced a proportional increase in benefits.

Table 4

Benefit Levels by Program and Enlistment Term

PROGRAM	ENLISTMENT TERM		
	TWO YEAR	THREE YEAR	FOUR YEAR
Ultra VEAP	12,800	17,400	17,400
Super VEAP	6,800	9,400	11,400
Tuition/Stipend	7,800	11,700	15,600
Noncontributory VEAP	7,400	12,100	14,100

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The experiment initially covered about 47 percent of Army positions, 18 percent of Air Force positions, and 10 percent of Navy positions. However, the experiment for the Army was changed during FY81. Initially, 45 MOS, primarily in the combat arms, were eligible for benefits. Because of recruiting difficulties, 20 additional MOS covering an additional 9 percent of enlistment slots were added to the experiment in February 1981. These new occupations were primarily in support functions such as legal clerk, dental specialist, air traffic control tower operator, and food service specialist. Thus, the experiment consisted of two separate program levels during the course of FY81.

An analysis of the enlistment effects of the Educational Assistance Test Program was performed by Fernandez (1982). He found that the Ultra VEAP program was the most successful in terms of increasing quality Army enlistments; it also did not appear to draw recruits away from other services. This program was implemented during FY82 as the Army College Fund.

Educational benefits for the military have not remained unaltered. Congress passed the New GI Bill which went into effect during July 1985. This program reduced service member contribution to $1,200 and increased benefit levels to $9,600 for the basic enlistment in all services. Also, unlike VEAP where soldiers were permitted refunds of their contributions at any time, once enrolled in the New GI Bill, soldiers may not remove their contributions. While the Army retains higher benefits for enlistment in critical skills (up to $14,400 more), there is concern as to what the impact of the new program will be, given greater benefits and lower costs for enlisting in other services.

EDUCATIONAL BENEFITS AND POLICY ISSUES

Military educational benefits raise a number of policy issues. These include both immediate direct program effects and indirect longer term effects. This section summarizes the major policy issues that have been raised either directly by educational benefits, or that have been hypothesized to be related to the principal effects of educational benefits.

When conscription was used to acquire recruits for the armed forces, educational benefits were viewed primarily as a compensatory mechanism and a way to provide social adjustment. With the end of the draft, benefits became viewed largely as an enlistment incentive. Chapter 32 of the U.S. Code, in laying out the purpose of the Veteran's Assistance Act of 1976, discusses the concept of promoting the all volunteer military by attracting qualified individuals through educational assistance.

When the all volunteer military was begun in 1973 pay was viewed as the principal mechanism that would attract people into military service. First of all, recruit pay during the draft was considerably below any comparable civilian employment; substantial pay increases would be required to make military service a competitive source of employment. Second, pay and bonuses were believed to be much more effective in relieving critical manpower

shortages than such deferred benefits as educational opportunities. It was
generally believed that young people discount benefits received in the future
at a high rate. Their effect on present behavior would be minimal in
comparison to their long-term costs.

As recruiting problems developed, in the late 1970s there was a concern
that new tools would be needed to attract people to the military. Surveys,
such as those described by Phillips (1986), had found that traditional
benefits such as pay and skill training did not appeal to a large segment of
the population. Middle class and college bound youth were largely
insensitive to higher pay. The long interruption of their careers and the
generally undesirable nature of military service were viewed as factors that
would eliminate military service from consideration. However, there was an
indication that educational benefits could appeal to a portion of this
population. These findings led to the concept of the "dual market". Dual
market referred to the idea that some youth were college bound while others
were work oriented. Educational benefits could then be used to appeal to a
separate pool of the eligible youth market.

Total program cost was also a key element of educational benefit program
design. Cost had clearly played a major role in terminating the Vietnam era
GI Bill. Nelson (1986) reported that the $1.5 billion steady-state cost of
the GI Bill made the program too expensive; there was a high economic rent
involved in such benefits. Many individuals might not be motivated to enlist
because of the benefits, yet found themselves using them since they were
available.

Thus, several features of benefits were developed to limit costs. First,
soldiers were required to contribute a portion of their own money to be
eligible for educational benefits. Second, these benefits were to be
targeted towards critical skills, generally hard-to-fill jobs in the combat
arms. Finally, benefits were restricted to high school graduates scoring at
the 50th percentile or above on the AFQT. This was even more restrictive
than the cash bonus program, that was awarded to graduates scoring 31 or
above on the AFQT. Such targeting of benefits was justified because the
benefits would be most likely to appeal to individuals with high test scores
and the costs would be minimized.

Cost of the program to the individual was a related and important issue.
There was a concern that the contributory requirement introduced by VEAP
would greatly reduce the desirability of educational benefits. Also, while
economic theory would hypothesize that larger benefits would attract more
qualified enlistments, it was not at all certain that the increase would
warrant the expense.

Others have raised the issue of whether individuals with higher test scores
and high school diplomas were worth the additional cost. Implicit in these
restrictive eligibility criteria is the idea that such individuals would
display greater productivity on the job. Graduates should be more likely to
complete their enlistment, and recruits with high test scores would perform

more ably on the job and be able to learn the highly technical tasks of the modern military.

These concepts have been generally upheld, and there is considerable evidence that high school graduates are more likely to complete their enlistments (Buddin, 1981) and perform well on various measures of job performance (Fernandez & Garfinkle, 1985; Scribner et al., 1986). However, the higher productivity is not without its skeptics. For example, The General Accounting Office (1986), has raised the question of whether the services really need large numbers of college bound youths. Other researchers question whether such factors really predict higher productivity in the military. Butler (1976), in examining promotion speed in the Army, a hypothesized to be a performance indicator, found lower test scores and educational attainment generally associated with faster promotion.

Others have argued that the composition of the work force may be more important than individual aptitude. Hauser (1980) argued that a certain proportion of highly trainable and adaptive soldiers were required during the draft era to perform administrative and technical functions and to assist their peers in adapting to the work environment. Kahan, Webb, Shavelson, and Stolzenberg (1985) and the Congressional Budget Office (1986) have discussed how the nature of the work place may affect the performance of a group. Depending on the technology, output could be determined by the best performer, the worst performer, or the average individual.

Retention is also an important issue with respect to educational benefits. In the hearings for the Educational Assistance Test Program, it was suggested that generous benefits could encourage highly qualified soldiers to leave the service precisely at the point when they are most needed to move into senior technical and leadership positions. Others, such as Thurman (1986) and Roll and Warner (1986) have argued that the military does not need to reenlist everyone who completes their first enlistment; the additional turnover generated by educational benefits would be acceptable. Furthermore, reenlistment bonuses could be given, and educational benefits could be cashed out to remove the reenlistment disincentive.

In addition to the direct economic consequences, indirect effects have entered the debate on the merits of military education incentives. These indirect effects, while not necessarily a part of immediate personnel management concerns, often dominate the policy debate over the direction of such programs. There may be benefits that occur to society as a whole, but are not directly accountable to either the military or the government. Some of the prominent social impacts of educational benefits are summarized here.

Proponents of educational benefits have argued that such programs are generally highly productive from society's standpoint. The investments made by such programs, in term of human capital, add materially to the production of wealth and the participants pay back substantially more in taxes than the program's initial costs. General statistics on veteran earnings (Veterans Administration, 1983) and several economic analyses of veterans earnings that control for other factors affecting earnings (Goldberg & Warner, 1986;

Daymont & Andrisani, 1986) have provided some support for this thesis. However, it is difficult to separate out many of the factors that contribute to such earnings programs, such as the selection processes of the military, self-selection of program participants, and the role of veteran versus other potential sources of education financing.

The military services have also provided social mobility for a large segment of society. Many individuals with lower socioeconomic status, including minorities, have relied on the military as a mechanism for upward mobility. This concept of aiding individuals to attain their desired level of education was listed in the VEAP legislation as a principal purpose of the program. This concept is supported by analysis by O'Neill, Ross, and Warner (1978), who found that once one controls for test scores, minorities were more likely to use benefits, particularly for college. If the military did not provide this mechanism, one could argue that either the costs of educational assistance provided by the Department of Education and state governments would increase or many individuals would go without educational assistance.

Another social issue that is related to military benefits is the concept of equity to the veterans. Those individuals who provide for the defense of their country, even as volunteers, should be given a way to transition into civilian life. Although pay may be more competitive in the volunteer era, many of the jobs, (particularly in the Marine Corps and Army) provide very minimal skill training that can be used in the civilian labor market. This is borne out by studies such as Westat (1986) that found 68 percent of Army veterans described their military training to be unrelated to their post-service employment. The military has been *criticized for recruiting* people into the service and then returning them to society three years later with no marketable skills. The negative feedback and word-of-mouth from veterans could also hinder future recruiting.

Another point that has been made in favor of educational incentives is their marketability. There is widespread acceptance of the military as a provider of opportunity to receive skill training and education. It is socially permissible to advertise college scholarships as a recruiting tool; promoting of pay and bonuses is likely to elicit complaints of the mercenary nature of military service. Furthermore, educational incentives provide a socially acceptable reason for enlisting. Parents and peers may be more receptive to enlisting for the purpose of eventually going to college than they otherwise would be to joining the Army.

Not everyone is totally supportive of military educational benefits. Some have argued that such benefits implicitly discriminate against women, since the military severely limits the numbers of women who may enlist. Also, the high test scores required for special educational incentives implicitly limits the access of many minorities to such benefits.

Sociologists such as Moskos (1977) have also criticized the volunteer Army for a variety of reasons. The use of economic incentives ignores morale, cohesion, and commitment towards goals. The emphasis on pay and job skills

is not desirable for the military since military service is fundamentally different from civilian employment in these very same ways. Educational benefits overcome many of these problems through less emphasis on immediate economic gratification and greater reliance on long-term goals and motivation.

Some individuals such as Kester (1986) have spoken out against the all volunteer military for strategic reasons. While not all of their complaints would be alleviated by educational benefits, several of their concerns could be. For example, educational benefits would likely result in a greater and more varied portion of the population having exposure to the military and a larger population from which society could rely on in case of mobilization.

The social representation of the military has also been an issue since the end of conscription. Representation and the military differ from the usual concerns over race and gender discrimination. The military has been viewed by many minorities as a mechanism for upward social mobility (Moskos, 1980). In fact, the post-Vietnam Army has typically enlisted over twice the proportion of blacks found in the eligible youth population. Thus, an issue of the post-draft military has been its representation of the middle class. Enlisting people from the poor and minorities has not been a problem with the higher pay of the all volunteer military. Kester (1986) argues that the draft is needed to assure that the military does not become a purely mercenary force. Cooper (1981), Coffey (1981), and Moskos (1977) also discuss the concept of social representation in the military.

While representativeness is not an explicit goal of educational benefits, it has been identified as a likely byproduct of using such an incentive. Phillips (1986) discusses how such a program provides a mechanism to compete for college oriented youth through the use of educational benefits and shorter enlistments.

LITERATURE REVIEW

Previous discussion on policy issues relevant to military educational benefits has identified several areas where such benefits could affect both the military and society. One area where benefits would almost certainly produce substantial changes is the Army's personnel system. This includes enlistments, retention, and costs of the educational benefit program. The literature relevant to program impacts in these areas is reviewed here. This includes both theoretical models of how such incentives would be hypothesized to produce changes, and empirical results, where available, on previous research that has investigated such changes.

Enlistment Effects

Educational benefits can be construed as a form of compensation. An increase in benefits could be expected to increase labor supply by either a move to the right along an existing supply curve or a shift to the right by a new supply curve. Figure 2 illustrates this effect. Initially the military
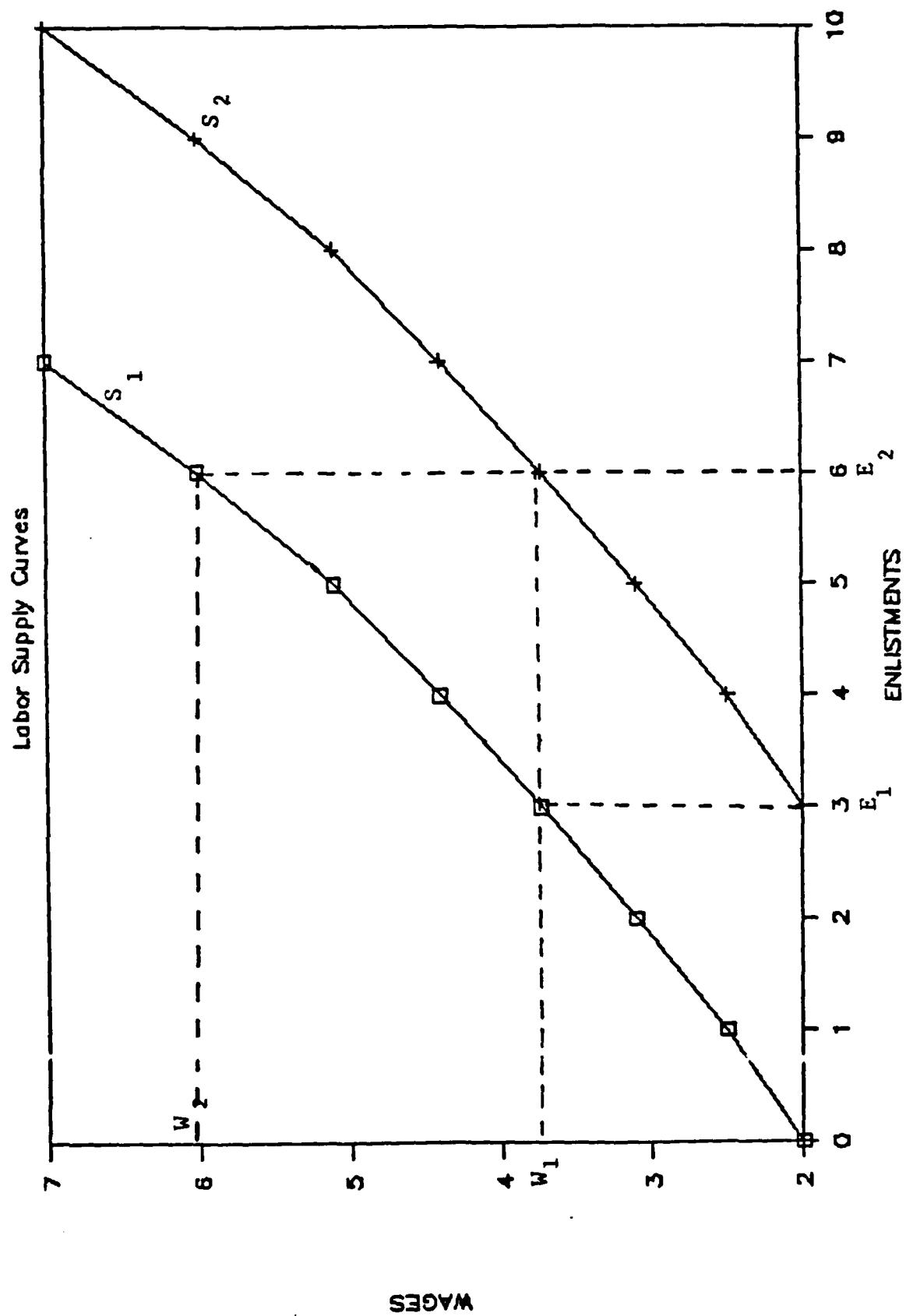
Labor Supply Curves

Figure 2. Labor supply curves

offers wage rate W_1 and receives E_1 enlistments. If educational benefits are provided to qualified recruits, the number of enlistments could be expected to rise to E_2. If the provision of educational benefits is construed as an increase in the wage rate then the interpretation is that wages have risen to W_2; if educational benefits are considered as a separate effect from wages then the program's impact could be interpreted as a shift to a new supply curve S_2.

However, educational benefits differ from wages in two important aspects. First, benefits are deferred until the individual completes his or her enlistment. Second, there is uncertainty concerning their actual usage. The individual may elect to remain in the military, leave and not attend college, or leave and attend only long enough to use part of the benefits. The uncertainty and subjectiveness of the value of this benefit makes it difficult to assess its worth to any one individual.

The Congressional Budget Office (1982) used such a theoretical approach to estimate the effects of selected educational benefit programs on enlistments, retention, and cost. Benefits were discounted into their present value at the time of enlistment. The effects of pay on enlistments as estimated in other studies was then used to project the effect on the supply of enlistments. One of the plans evaluated was the same as the Ultra VEAP. It was estimated that such a program would increase Army enlistments from 2 to 6 percent. The low estimate assumed that the indiv'dual expected to use benefits at the rate experienced by Vietnam-era GI Bill participants; the high estimate assumed the maximum benefit usage.

The advantage of this approach is its directness. The impact of a hypothetical program can be assessed immediately, without undertaking an expensive experiment, collecting data, and performing statistical analysis. However, the drawbacks can be substantial. First, one must assume that educational benefits are valued in the same way as income. One must make assumptions concerning the individuals discount rate and inflation in order to cost out benefits. Differences in individual discount rate directly affect one's willingness to invest in human capital (Rosen, 1977). Thus, educationally motivated enlistees could differ substantially in their sensitivity to deferred compensation compared to the response of others to wages. Also, one ultimately relies on earlier empirical analyses on enlistment supply wage elasticities to generate estimates.

The Congressional Budget Office (CBO) model assumed educational benefits behaved as a movement along the wage-supply curve. However, an explicit test of this hypothesis (Brown, 1985) found that the increase in enlistments related to educational benefits was greater than that estimated by a similar wage effect. Thus, it appears more appropriate to model the educational benefit impact on enlistments as a separate program effect than simply as a part of the wage rate.

Brown (1985) also provided an estimate of the effect of educational benefits on Army enlistments. Brown converted educational benefit programs such as the GI Bill, VEAP, and kickers into their present value worth, using

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the same procedure as that used by CBO (1982). These values were then used in ordinary least squares (OLS) and generalized least squares (GLS) regressions of high quality male enlistments based on a pooled data set of states by quarter for fiscal years 1976-82. Brown found a very large effect for educational benefits. Where theory had led him to hypothesize that it would have the same effect as pay, the estimated effect was, in fact, approximately ten times as large.

Based on a description of Brown's (1984) procedure for valuing educational benefit effects and his coefficient estimates for high quality enlistments, it is possible to project the enlistment effects of two of the test programs. (Brown did not analyze the FY81 experiment; his geographic regions differed from the test cells.) The magnitude of his educational benefit effect would project substantial increases in enlistments for any program that increased educational benefits over the control program. Thus, Noncontributory VEAP could expect to increase enlistments by 65 percent and Ultra VEAP ACF by over 100 percent.

The bulk of research on the enlistment effects of educational benefits has relied on econometric analysis of the responsiveness of labor supply to changes in educational benefits. Table 5 summarizes several recent studies that have estimated the effects of the Educational Assistance Test Program or the introduction of the Army College Fund.

The EATP effect on enlistments in all services was analyzed by Fernandez (1982) for the Department of Defense. His regression model estimated the relationship of the three test programs on changes in the logarithm of enlistments. Controlling variables in his model included labor market conditions (hourly earnings, weekly hours, employment, and the unemployment rate), recruiters, and time trends. Data was aggregated by the 66 Military Enlistment Processing Sites (MEPS) and month for FY80-81. The Ultra VEAP test cell was found to increase Army enlistments by 9.1 percent without negatively impacting on Navy or Air Force Recruiting. This was very similar to the estimate of an 8.7 percent increase in enlistments over that experienced by the control cell computed by direct tabulation. (A comparison of FY81-82 enlistments later found an 8.6 percent increase).

Dale and Gilroy (1983a) used an econometric time-series model to examine the effect of various factors, including educational benefit programs, on Army high quality enlistment contracts. Using data between October 1975 and March 1982, they determined that the GI Bill and the introduction of the ACF both significantly increased high quality male enlistments. They estimated that the introduction of the ACF would have increased such enlistments about 19.6 percent.

Fairchild et al. (1984) developed an econometric model to explain enlistments using a monthly data base of Army recruiting districts for FY81-84. Their model contained categorical variables to estimate the effects of the Tuition/Stipend and Noncontributory VEAP programs in FY81 and the Ultra VEAP/Army College Fund variable during FY81-84. Their model found the ACF variable to be statistically significant and equal to about 30 percent,

Table 5

Estimates of the Enlistment Effects of Educational Benefits

		Percent Enlistment Gain (Relative to Super VEAP)		
Researcher	Method/Data	Ultra VEAP ACF	Noncontrib- utory VEAP	Tuition Stipend
CBO (1982)	simulation	2 - 6	0 - 4	-
Fernandez (1982)	econometric/ 80-81 MEPS	9.1*	1.3	-5.7*
	ANOVA/ 81-82 MEPS	8.6*	-	-
Dale & Gilroy (1983a)	econometric/ time series 75-82	19.6*		
Fairchild (1984)	econometric/81-84 Army districts	32.3*	-22.1*	-6.0
Daula & Smith (1986)	econometric/81-83 Army districts			
	supply constrained	31.7*	-8.8	-12.6
	demand constrained	4.7	3.8	7.7
Goldberg (1983)	econometric/ 76-82 Navy districts	15.0*	-	-
	78-82 Navy districts	20.9*	-	-
Goldberg (1986)	econometric	0.2	-	-
Brown (1983)	econometric (GLS)/ 76-82 states	102*	65*	-
Polich et al. (1982)	survey/ 81 applicants	3.6	1.4	-
Elig et al. (1985)	survey/ 82 recruits (a)	14.2	-	-

* p < .05

(a) Estimate is for all kickers, not relative to Super VEAP.

while the other programs (Super VEAP, Noncontributory VEAP, and Tuition/Stipend) had insignificant effects on enlistments.

Goldberg and Greenston (1983; 1986) also estimated the impact of the Army College Fund on Army enlistment contracts. They used a pooled cross-sectional time series model estimated from annual data of Navy recruiting districts for various time periods between 1976 and 1983. The experimental test cells during FY81 were ignored; a categorical variable was used for FY82 and beyond to estimate the enlistment effect of the Army College Fund. Goldberg produced three separate estimates of the enlistment effect of the ACF. The first two, using data through FY82 showed a strong and significant enlistment effect. The latter, which included FY83 data, estimated a negligible and insignificant effect.

The implementation of the Educational Assistance Test Program in FY81 was not the only major change in recruiting policy that occurred during that year. During FY81, the US Army Recruiting Command also changed its management system for its recruiting force. Recruiters were given specific objectives for the numbers and types of people they should recruit each month. Greater emphasis was placed on the importance of high quality contracts. Moreover, recruiters were evaluated on the number of contracts signed into the Delayed Entry Program, rather than on the number of enlistments entering onto active duty.

Several recent analyses of military enlistments have stressed these changes by incorporating production theory into their models. The number of recruits desired by the Army is known. Each recruiter is given a goal or mission of the number of signed enlistment contracts for each month. This goal, while serving as a general impetus to produce contracts, could constrain production in excess of the goal.

Dertouzos (1985) demonstrated how recruiter missions could impact on the supply of recruits, even for those groups that are generally supply constrained. Figure 3 shows how an increase in supply could affect recruiter possibilities. The solid curve reflects the recruiting tradeoff possibilities between high and low quality recruits that were possible at a point in time. The recruiter is initially producing 8 high quality enlistments and 7 low quality enlistments. A changing environment causes the tradeoff curve to shift outward. The recruiter is faced with a number of alternative possibilities. For example, the recruiter could increase production of high quality recruits to 14 while increasing the total number of recruits by only 2. Or, the recruiter could maintain the same number of high quality enlistments and increase low quality contracts from 7 to 12.

Dertouzos estimated the enlistment effect of the Ultra VEAP test program, taking into account the effect of recruiting missions. The following equation was proposed for high quality enlistments (H):

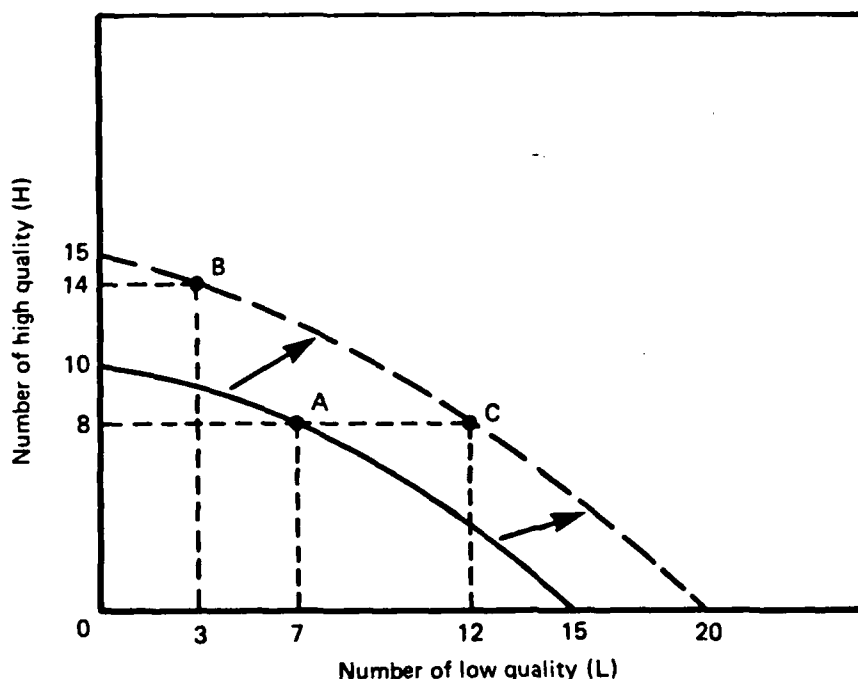$$\log(H) - f(U, W, R, P, M, L) \tag{1}$$

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Figure 3. Recruiting production tradeoff possibilities.

where the explanatory variables include the unemployment rate (U), wage rate
(W), number of recruiters (R), population (P), monthly factors (M), and
number of low quality enlistments (L). However, L and H are endogenously
determined. Equations to estimate high and low quality enlistments would be:

$$\log(H) = f^1(U, W, R, P, Q_H, Q_L) \qquad (2)$$

$$\log(L) = f^2(U, W, R, P, Q_H, Q_L) \qquad (3)$$

where high quality (Q_H) and low quality (Q_L) recruiting missions are
determined exogenously.

Using the same data as Fernandez, Dertouzos estimated that the Ultra VEAP
test program increased enlistments by 10.9 percent, once recruiting missions
were introduced to account for demand effects.

Daula and Smith (1986) also incorporated management objectives into a
recruiting supply model. The hypothesis they address is that enlistment
production may be less than supply theory alone might estimate if missions
are not increased. At a given wage W_1 the Army receives a particular number
of enlistments. The number of enlistments is said to be supply constrained.
When the wage rate rises, enlistments only rise to the enlistment goal. In
this case, the organization is said to be demand constrained.

Daula and Smith distinguish between recruiting districts that are demand or
supply constrained. Observations that produce less than the high quality

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recruiting goal were used to estimate the supply function, while the remaining observations were used to estimate demand constrained production. A switching regression was estimated where:

$$\ln(S) = a_i(\ln X_i) \qquad (4)$$

$$\ln(P) = b(\ln Q) + (1-b)\ln(S') \qquad (5)$$

Equation 4 is used to estimate the enlistment supply if enlistments were less than the goal. Explanatory variables comprising the X_i include relative military pay, population, unemployment, recruiters, local and national advertising, seasonal factors, and educational benefit test programs. If enlistments exceed the goal, equation 5 is used. If b equals one, the number of enlistments equals the goal exactly. In practice, the model allows for supply to decline by a proportion to be estimated empirically.

Daula and Smith also estimated the enlistment effects of these two models. During the period they analyzed, almost 80 percent of the recruiting districts met or exceeded their quality enlistment goals. Table 5 provides the enlistment effects they estimated for demand and supply constrained districts. The Army College Fund program was estimated to increase the number of high quality enlistments by 31.7 percent for supply constrained districts, but by only 4.7 percent in a demand constrained recruiting environment. The supply constrained ACF enlistment effect estimate was the only educational program effect that significantly differed from zero.

An alternative way of estimating the effect of educational benefits on enlistments has been through surveys. An appropriate group of individuals is presented a series of alternatives and asked which one they would choose. While such responses are hypothetical, and cannot easily control for confounding factors and biases resulting from the subjective nature of the decision, they can provide an indication of the relative magnitude of program effects.

Two surveys have been performed on the effect of educational benefits on enlistment probabilities. The first, (Polich, Fernandez, & Orvis, 1982) was administered to a sample of 3,500 military applicants during the EATP. Individuals were asked how various levels of educational benefits would affect their likelihood of enlisting. Survey respondents intentions were adjusted based on previous studies of the relationship between intentions and enlistments. A 3.6 percent enlistment increase for Ultra-VEAP and 1.4 percent increase for noncontributory VEAP were estimated by extrapolating survey levels to program levels. The authors viewed these enlistment effects as lower bounds, since they assumed no expansion of the applicant pool.

The second survey (Elig, Johnson, Gade, & Hertzbach, 1984) was administered during 1982 to new Army recruits. Respondents were asked what they would have done if the ACF program were not available. Approximately 14 percent stated they would not have enlisted. This can be viewed as an overestimate of the effect of the ACF, since it is relative to basic VEAP, not the Super VEAP control program.

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Occupational Choice

A feature of educational benefits is their application to specific occupations. Incentives are targeted in that they only apply to individuals with desired characteristics, and only if they enlist in certain occupations. This is an important point for personnel management in that many occupations would be difficult to fill with highly capable candidates since they offer little transferable training and have demanding and undesirable working conditions.

There has not been any detailed analyses of the effects of educational benefits on military occupational choice. Fernandez (1982) noted that the Ultra VEAP test cell did substantially increase high quality enlistments in the eligible skills, although there was no corresponding decline in quality enlistments in other occupations. An explicit analysis of the effect of cash enlistment bonuses on occupational choice was performed by Polich, Dertouzos, and Press (1986). They performed a detailed analysis of an experiment offering increased cash enlistment bonuses in selected regions of the country. After controlling for the program's effect on enlistments, they found the bonuses also substantially increased the channeling of high quality recruits into the experimental occupations.

Retention Effects

Two effects of soldier turnover are important for manpower planning: attrition and reenlistment behavior. Attrition refers to the likelihood that the enlistee will fail to complete the initial enlistment tour. The reenlistment rate is usually expressed in conditional terms. That is, given the individual has not attrited, what is the probability he or she will remain in the Army. Attrition and reenlistment behavior are useful for manpower planning analysis. From them one can estimate the long-term recruiting requirements, the experience level of the force, and personnel and training costs.

One important question concerning educational benefits is their reenlistment effect. Economic theory predicts that educational benefits would have a negative impact on retention. Eligible soldiers at the reenlistment point have the option of reduced costs for attending school. Furthermore, given their awareness and knowledge of educational benefits when they enlist there is likely to be self-selection of applicants on the basis of educational benefits; individuals motivated by educational benefits will be more likely to enlist.

No empirical research has been performed on the reenlistment effects of educational benefits. The CBO (1982) in its analysis of military educational benefits also projected their retention effects based on an ACOL type model. CBO estimated that the reenlistment effect would be a 2 percent reduction in

reenlistment rates for the ACF and a 3 percent reduction for the noncontributory VEAP.

Benefit Usage and Costs

An important final concern in educational benefits is their long-term costs. No one challenged the GI Bill as a positive motivation for enlistment. The projected 1.5 billion dollar annual costs of the Vietnam era GI Bill was the major reason for its replacement by the VEAP.

Cost of benefit programs is a function of four factors:

1) the probability of attending school

2) the persistence with which one attends

3) the time that is taken to attend school

4) the appropriate interest rate.

Once one has knowledge of these factors one can convert benefit usage to present value costs. This permits comparisons among alternative educational benefit programs, and with other personnel programs such as pay and bonuses.

Three cohort analyses include data on college continuation behavior:

1. The National Longitudinal Study (NLS) of the High School Class of 1972.

2. The 1979 wave of the National Longitudinal Survey of Labor Force Behavior, Youth Survey.

3. The High School and Beyond Survey of 1980.

The NLS Class of 1972 provides the most complete recent cohort that can be studied for college attendance and completion behavior. Manski and Wise (1983) analyzed the college attendance and persistence behavior of this cohort of high school graduates. Using logistic regression, and controlling for applicant and college selection behavior, they were able to identify many factors as predictors of behavior in higher education. Factors that positively affected attendance behavior included high SAT scores and class rank, black, low local wages, male, high parental income, and high proportions of the high school class attending colleges. Factors associated with persistence included Scholastic Aptitude Test (SAT) score, high school rank, black and from the south, high parental income, and high proportions of the high school class attending colleges.

Most of the analysis of military service and post military outcomes has focused on income. O'Neill et al. (1978) investigated the veterans benefit usage of individuals separating from the military during 1971. They found

that those with high AFQT scores, those having more than a high school education, and blacks were more likely to use benefits and use more months of benefits. The Veterans Administration (1981) also reported on benefit usage of Vietnam era benefit usage under the GI Bill. They found a majority of veterans used some benefits, but the average proportion of available benefits used was small.

Cohen, Segal, and Temme (1986) did investigate the relationship of military service to educational attainment of a group of high school graduates. They found a generally negative effect of service on educational attainment during the 1960s. Tannen (1987) examined the enrollment characteristics of the ACF participants, but his data was too recent to investigate any usage effects.

The lack of any empirical data on post GI Bill veterans educational benefit usage has not prevented various organizations from estimating projected usage or costs. Congressional Budget Office (1982) provided cost analysis on two options of relevance to the EATP. These were essentially the ACF and a noncontributory ACF. The ACF was estimated to cost $110 million in the steady state; the noncontributory program, $342 million. Cost estimates for the noncontributory program assumed all enlisted personnel would receive this benefit. (In the experiment only high quality individuals in selected occupations were eligible.) Thus, the noncontributory program estimates considerably overstate the costs that would be projected for this program.

Other cost projections have been made by the Veteran's Administration, the Department of Defense, and the Congressional Budget Office. These appear in Table 6. (See Congressional Budget Office, 1985).

Table 6

Estimated Usage Rates for the Army College Fund

Source	Participation Rate	x	Utilization Rate	=	Usage Rate
Congressional Budget Office	45		67		30
Department of Defense	75		67		50
Veteran's Administration	75		40		30

The Department of Defense actuary uses the 50 percent usage assumption in their calculations of the cost of the ACF program. These cost estimates for each of the enlistment terms that resulted from these assumptions are provided in Table 7.

Table 7

Alternative Estimates of Present Value Costs for ACF Kickers

Enlistment Term	Nominal Kicker	DOD Actuary	Schmitz, Dale, & Drisko
Two Year	$ 8,000	$2,772	$2,652
2 + 2 Year	$12,000	$4,158	$3,979
Three Year	$12,000	$3,528	$1,618
Four Year	$14,400	$3,600	$1,152

A preliminary investigation of the costs of the ACF was performed by Schmitz, Dale, and Drisko (1987), who analyzed the benefit usage of FY81-82 ACF participants over the first one to two years after separation. Their model decomposed the probability of college attendance into a series of factors: probability of contributing to the program, probability of serving long enough to obtain program eligibility, probability of separating from the military, and probability of commencing benefit use on separation (There was virtually no benefit use in service). They projected a net usage rate of about 35 percent, and considerably lower costs for the program than the DOD assumed. These cost estimates associated with their usage estimates are also provided in Table 7.

It is apparent that there is no consensus as to what benefit usage the Army College Fund program might ultimately have. The projected cost of the program to the Army in its first full year of actuarial funding, fiscal year 1986, was 120 million dollars. The estimates of Schmitz et al. (1987) would result in a cost projection of about 65 million dollars.

CONCLUSION

The Army College Fund has become an established part of Army recruiting since FY82. Over 50 percent of the Army's male high quality recruits enrolled in the ACF during its first five years of existence. There are several studies that confirm that many of these recruits would not have entered the Army without the ACF. However, there is little consensus as to the precise enlistment effect of the ACF, as it ranges from about 9 percent (Fernandez, 1982) to 32 percent (Daula & Smith, 1986) in the more analytically sound models.

The enlistment and cost analyses that have been performed permit some assessment of the cost-effectiveness of the ACF as an enlistment incentive.

Combining the high (DOD)and low (ARI) cost assumptions with high (Daula & Smith) and low (Fernandez) enlistment effects, one can estimate the sensitivity of enlistment effects to changing assumptions of effectiveness. Table 8 illustrates the results under these assumptions. Under the most conservative assumptions (DOD costs and Fernandez enlistment effects) the cost of the ACF comes to about $16,000 for each additional high quality recruit. This is the same marginal cost as enlistment bonuses (Polich et al., 1986). If one assumes either lower program costs or a larger enlistment effect, then the program becomes a very cost-effective market expansion mechanism.

Table 8

Alternative Estimates of the Marginal Enlistment Cost of the ACF

Enlistment Effect	Cost Assumption	
	DOD	ARI
Fernandez (9.1 percent)	$16,000	$7,800
Daula & Smith (31.7 percent)	$ 6,500	$3,100

This single extrapolation illustrates some of the issues surrounding the ACF's effectiveness. There exists little research to date as to the impact of ACF on other important areas of manpower: choice of MOS, attrition, reenlistment, or program costs. Many important questions need to be addressed in these areas; there are important considerations for the use of the program for quality distribution, first term soldier performance, career retention, and program cost-effectiveness. There is a need for systematic research on these program effects, along with the investigation of the effectiveness of educational benefit programs for attracting, distributing, and maintaining the quality of people needed by the Army.

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